

## The Effect of Minocycline on Spatial Learning and Memory Performances and c-Fos Protein Expression in Hippocampus of Lipopolysaccharides-Induced Neuroinflammation Rat Model

**Fareedzul Amir Mahamad Samsi\***, Idris Long  
<sup>2</sup>*School of Health Sciences, Universiti Sains Malaysia,  
16150 Kubang Kerian, Kelantan  
fareed.upsk13@student.usm.my*

### Abstract

**Introduction:** Minocycline is a semi-synthetic second generation of tetracycline antibiotics. Recent studies found that it has anti-apoptotic and anti-inflammatory functions by modulating the action of microglia cells activation and subsequent release of cytokines.

**Methods:** Thirty-five adult male Sprague-Dawley rats were used and divided into five groups; GC group (control group, n=7), LPS group (LPS-treated only, n=7), LPS + 50MN group (50 mg/kg of Minocycline, n=7), LPS + 100MN (100 mg/kg of Minocycline, n=7) and LPS + 2MM group (2 mg/kg of Memantine, n=7). After single dose infusion of 5 mg/kg of LPS, the rats were treated with their respective drugs for seven consecutive days. Then, all the rats were tested their spatial learning and memory performance using Morris water maze apparatus, for five acquisition days and followed by probe test on the next day. Twenty-four hours after the test, all rats were euthanised and heart perfusion and fixation technique was performed. The collected brain sample was proceeds with immunohistochemistry analysis for c-fos protein expression measurement in CA-1 hippocampus area.

**Result:** Statistically significant difference on travelled distance, escape latency and average swimming speed in all five days of acquisition within all the respective groups ( $p < 0.05$ ). The comparison between groups showed that rats from LPS + 100MN group exhibited shorter travelled distance compared to rats from LPS group ( $p < 0.05$ ) and faster average swimming speed compared to rats from LPS + 50MN group ( $p < 0.05$ ). For escape latency, rats from GC group performed better compared to rats from LPS group ( $p < 0.05$ ) and LPS + 50MN group ( $p < 0.05$ ). The number of site of platform crossovers and percentage time spent in the target quadrant showed statistically not significant differences between all the groups ( $p > 0.05$ ). C-Fos protein expression found not significantly difference in rat's hippocampus between all groups.

**Conclusion:** Higher dosage of Minocycline gives positive effect on spatial learning and memory performances compared to lower dosage and standard dosage of Memantine drug. There were no associations between the effect of Minocycline on expression of hippocampus c-Fos protein in LPS-induced neuroinflammation in rat model.

**Keywords:** Minocycline, Spatial learning and memory, Alzheimer's disease